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CAHFS

Copper and Selenium Deficiency in Ruminants



The California Animal Health and Food Safety Laboratory System is a cooperative effort involving:

School of Veterinary Medicine

California Department of Food and Agriculture

California's Animal Agriculture Industries

Copper and Selenium Deficiency in Ruminants

Trace element deficiencies account for significant losses in productivity and deaths in ruminants (cattle, goats, sheep) in California.

Copper and selenium deficiency are the most common trace element deficiencies seen in pastured animals throughout the state.

DISEASE SYNDROMES

<u>Selenium</u>	<u>Copper</u>
Nutritional Myodegeneration -white muscle disease (WMD)	Achromotrichia Enzootic ataxia/swayback
-cardiac necrosis	Spontaneous fractures
-paralytic myoglobinuria	Physal enlargements
Diarrhea	Diarrhea
Illthrift	Illthrift
Decreased immunity	Decreased immunity
Retained placenta	Anemia
Infertility, stillborns	"Falling Disease"

Primary copper deficiency occurs when dietary copper levels are less than minimum requirements.

Copper deficiency is often secondary to ingestion of high molybdenum or sulfate which bind copper and make it unavailable to the animal. High dietary calcium, zinc, iron and cadmium or excess soil ingestion can also interfere with copper absorption.

Selenium is transferred across the placenta but milk levels are low and deficiency can result in milk fed animals when birth stores are depleted by 3-4 months of age.

DIAGNOSIS

Copper

Copper deficiency in live animals is diagnosed by testing serum for copper. Serum testing is less sensitive than liver since serum levels do not decline until liver stores are depleted and are slow to rise after supplemented.

Inflammation may cause variation in serum copper.

Serum testing can be used on a herd screening basis when more than 5 animals are tested. Liver copper on slaughter animals is a more accurate indicator of deficiency.

Feeds can be analyzed for copper (Cu), molybdenum (Mo), sulfate and selenium to assist in determining suitable supplementation levels. The optimum Cu: Mo ratio in the total ration is 6-10:1.

Selenium

Selenium deficiency is confirmed in live animals by testing whole blood (EDTA) for selenium. Total selenium in blood is stable for long periods of time.

Slaughter liver samples can also be used to confirm selenium deficiency.

TREATMENT & PREVENTION

Prevention by oral supplementation is the preferred method.

Copper

Injectable copper can result in toxicosis in selenium deficient cattle. This was most often seen with Cu EDTA which is no longer available.

Copper glycinate has rarely caused toxicosis but is associated with injection site abscesses.

Oral copper supplementation can be done via intraruminal boluses, top dressing of pastures and addition of copper to salt mixes or to the total ration.

Selenium

Injectable selenium is effective in treating WMD but results in short lived blood selenium levels. Injections are not recommended for a long term supplementation.

Oral supplementation can be accomplished with intrarecticular selenium boluses which release 3 mg/head/day or by adding selenium to salt mixes and feeds.

Selenium and Copper Diagnoses in California 1999

